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# Naval Air Systems Command Systems Engineering Organizational and Process Initiatives

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# Outline

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- SE Issues
- Organization Structure
- Organizational Process
- SE Organizational Initiatives
- Technical Review Process
- Systems Engineering Process
- Summary

# SE Issues

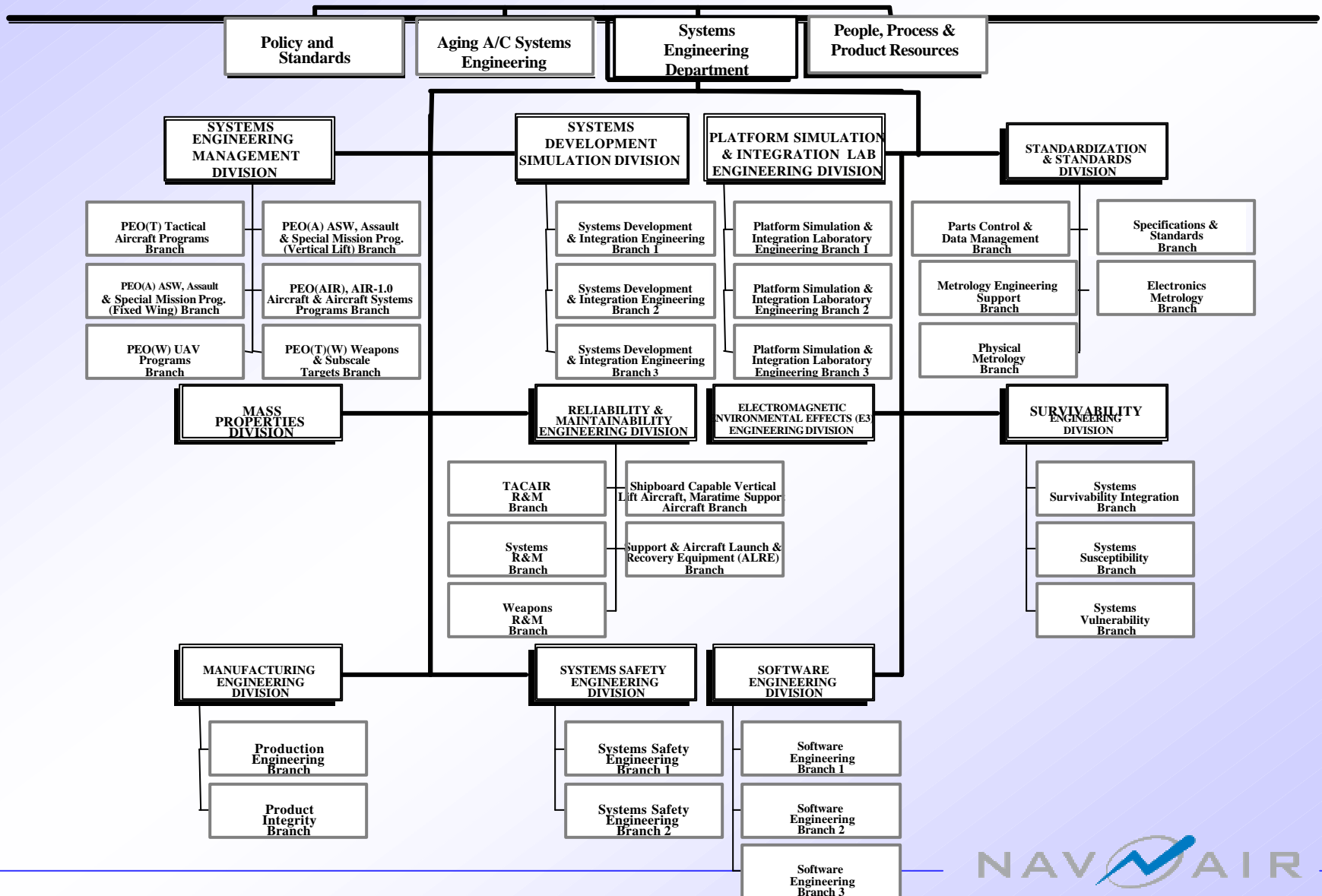
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- No common SE process
- Lack of clear, common definition of Systems Engineering
- What is the discipline today? So dynamic and changing.....
- Incompatibility between customer and provider SE
- Disconnect between education and practice
- Inconsistent appreciation of the value of SE
- No effective way to collect & share SE best practices
- Poor initial program formulation
- Accountability lacking.
- Empowerment/Certification lacking

“Systems engineering deficiencies have helped cause many of the problems plaguing military programs”

Pete Aldridge, the Undersecretary of Defense for Acquisition, Logistics and Technology

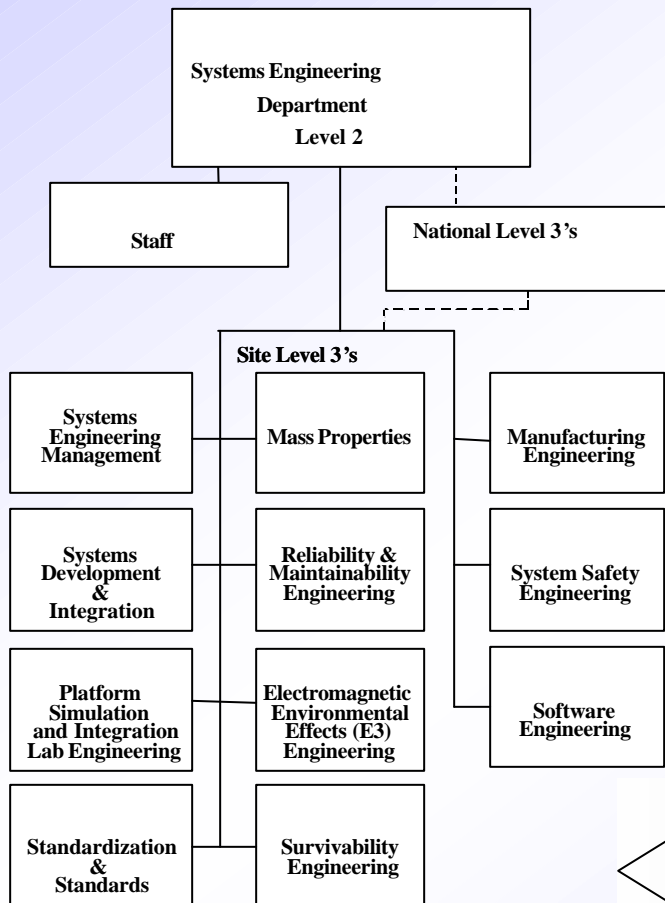
# System Engineering Department



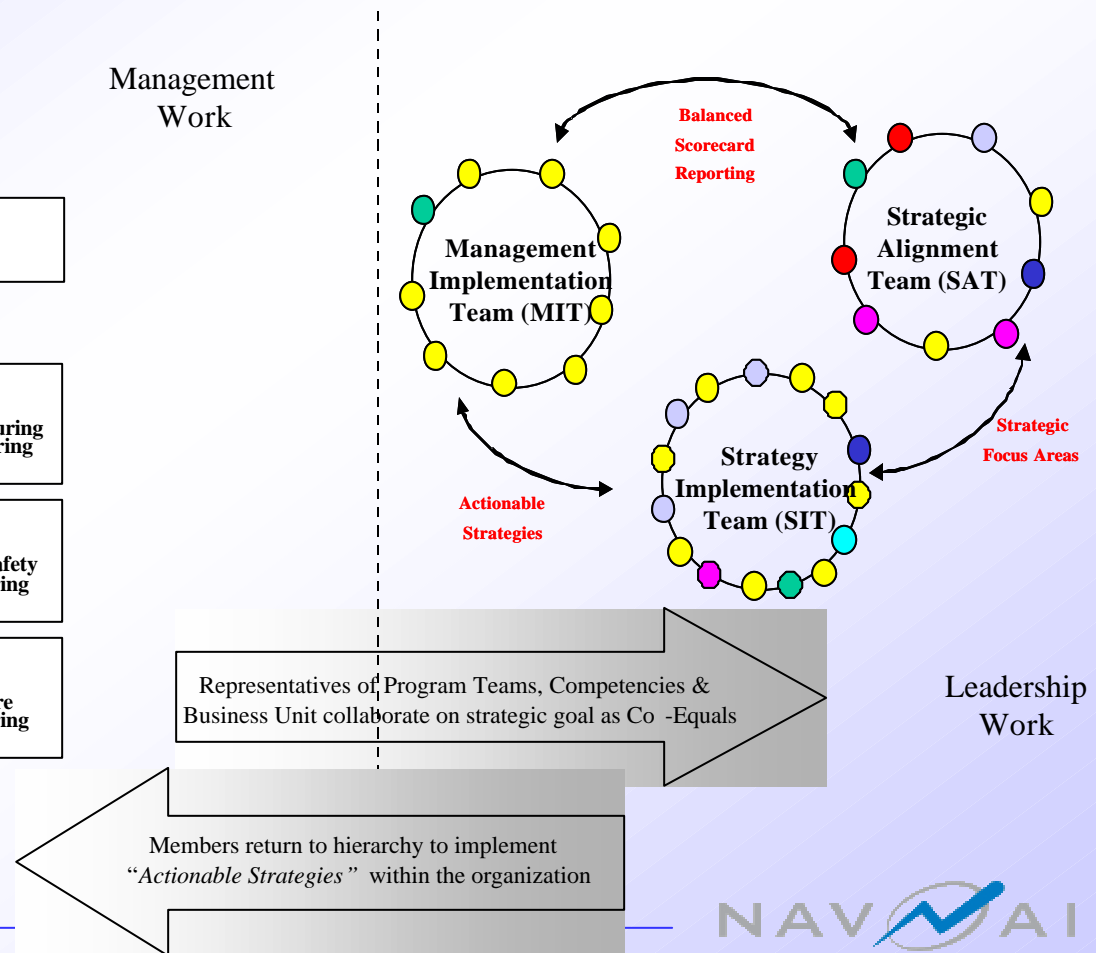


# Parallel Leadership Organization

*Hierarchy Organization*



*Parallel Organizations*

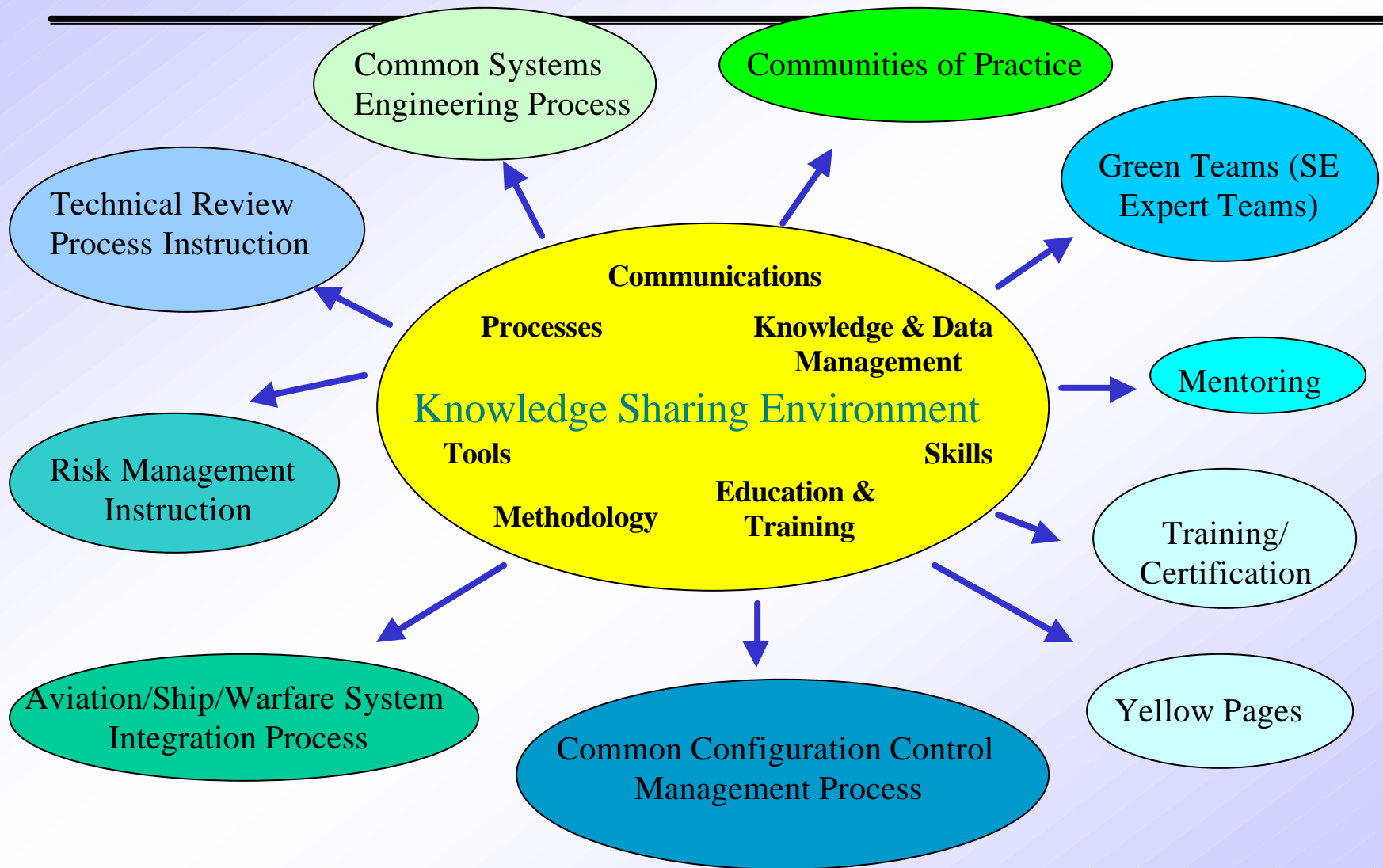


# Internal Teams

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- Strategic Alignment Team (SAT) – Leadership team” addresses important but not urgent matters, Strategic, has delegated management stuff to the MIT, looks long range, does environmental scan (external), long term (strategic focus).
- Strategy Implementation Team (SIT) – Leadership team, decision by consensus, developed the departments strategic plan, does strategic planning, develops actionable strategies to hand off to the MIT, also serves as a vehicle for group “by-in”.
- Management Implementation Team (MIT ) - Management team, important and urgent matters, tactical focus, consultative decision-making, charges w/ implementing the parts of the Strategic Plan as tasked by the SIT, does the tactical planning, primarily near focus.

# NAVAIR SE Initiatives

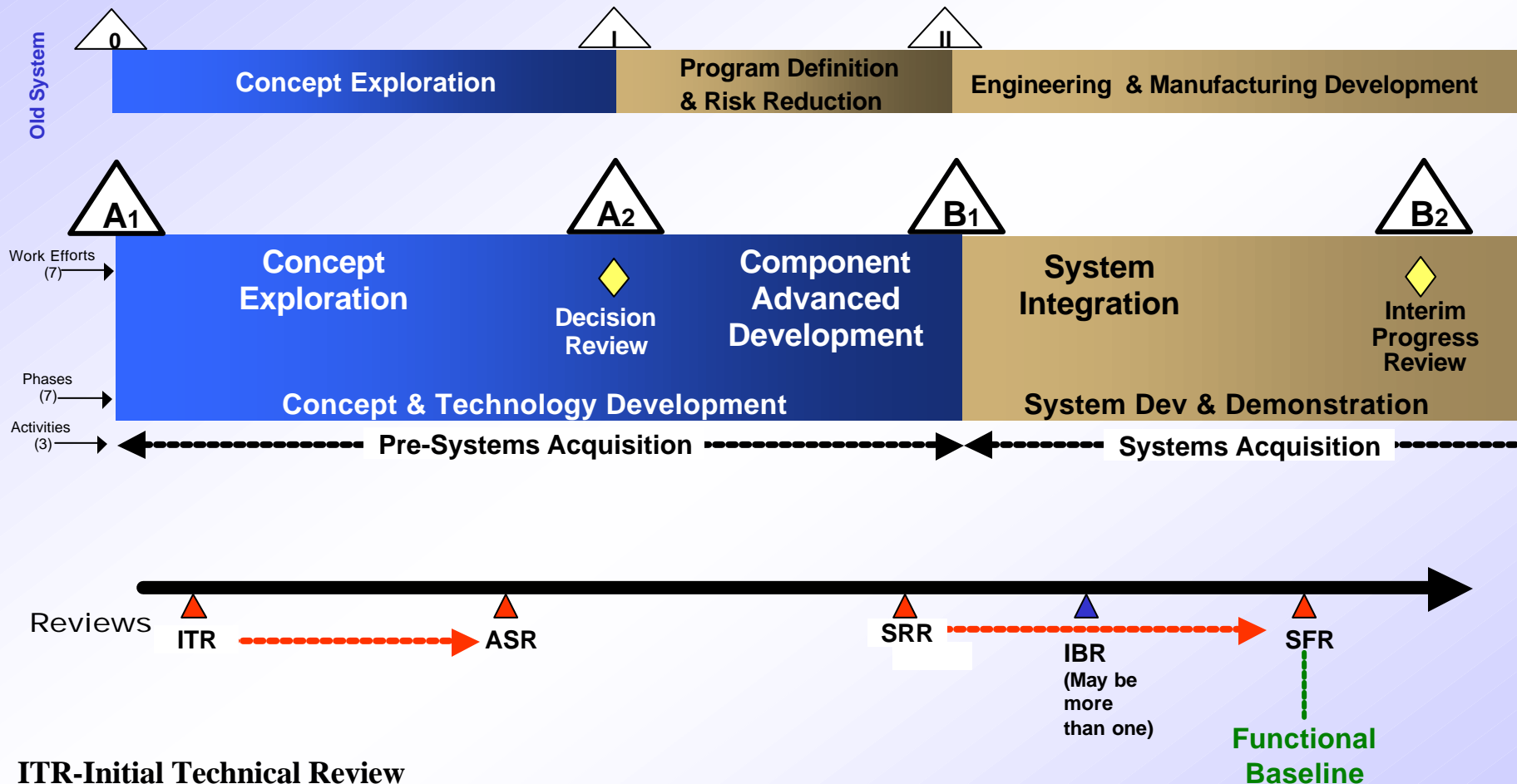


# Systems Engineering Technical Review (SETR)

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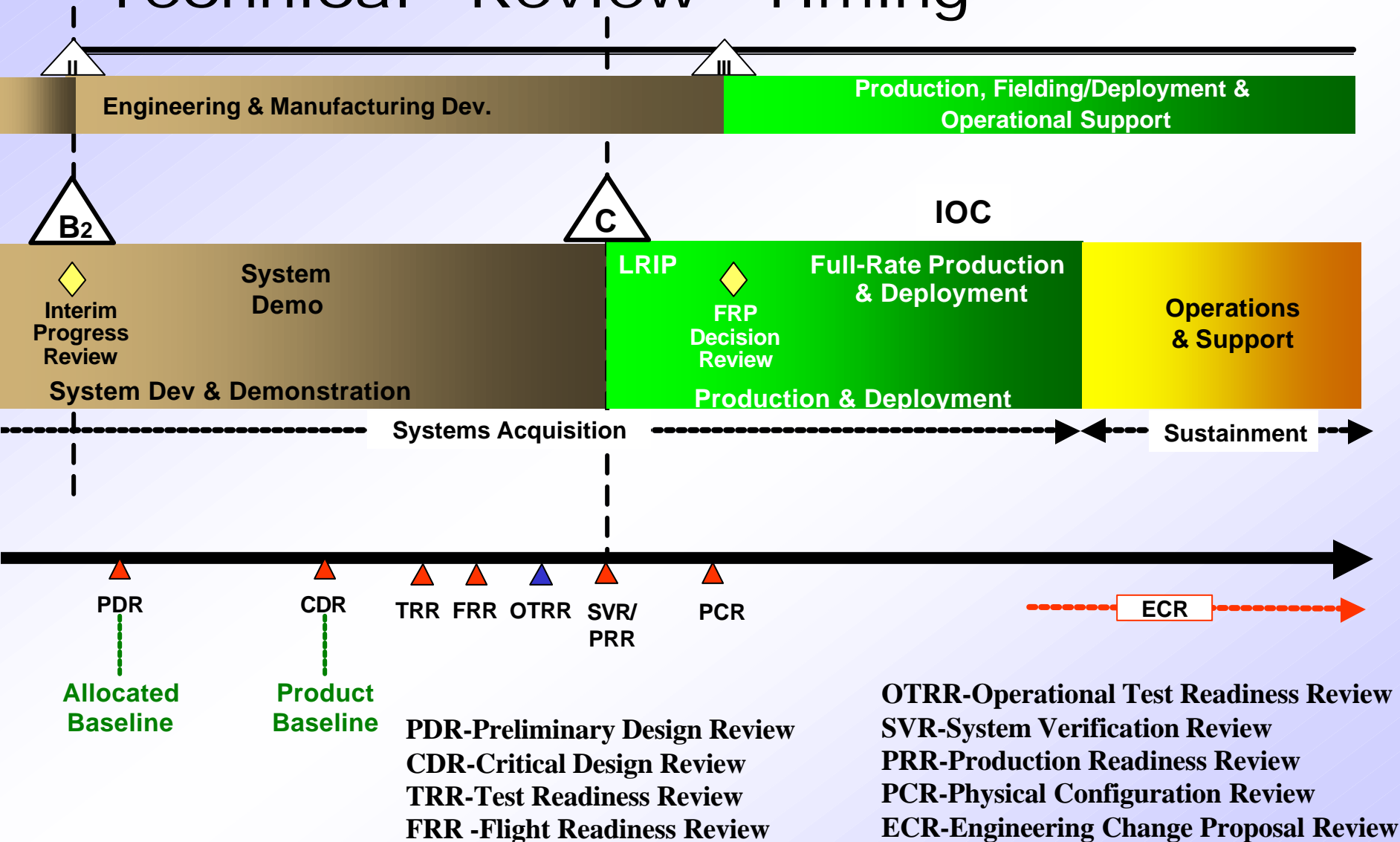
- Developed a NAVAIR SETR Instruction and Handbook
  - Applies to All Acquisition Category I-IV Programs (Use for Other Programs Encouraged)
  - Requires a Systems Engineering Management Plan (SEMP); SETRs Are Backbone of SE Management
  - Includes Module for Each Review, and
  - Risk Assessment Checklist for Each Review
  - Provides for Tailoring of Reviews (Deletion Discouraged)

# Systems Engineering



**ITR-Initial Technical Review**  
**ASR-Alternative System Review**  
**SRR-System Requirements Review**  
**IBR-Integrated Baseline Review**  
**SFR-System Functional Review**

# Technical Review Timing



# Implementation Observations

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Have Applied SRR, PDR, CDR, FRR, TRR, PRR Procedures and Risk Checklists on Several Programs

- Risk Checklists Have Shown to be Accurate Barometers of Program Health
  - Provides Mechanism for Articulation of Technical Risk
  - Sets “Chinning Bar” for Technical Insight
- Checklist Approach Provides Structured entry points for IPTs and Subject Matter Experts

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# NAVAIR SE Process Implementation



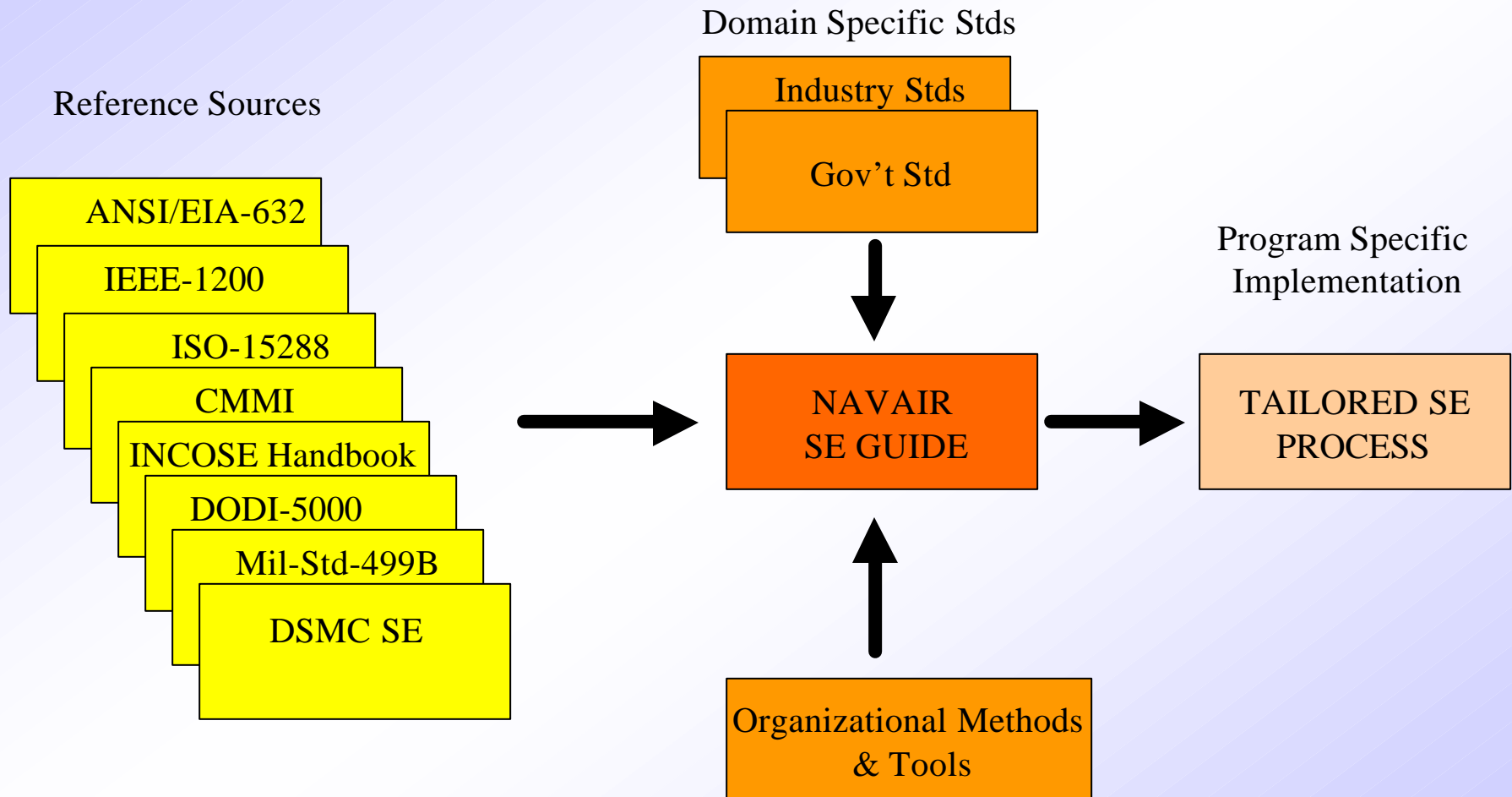
# SEPWG OBJECTIVE

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Systems Engineering Process Working Group (SEPWG) formed in FY00 with the goals of:

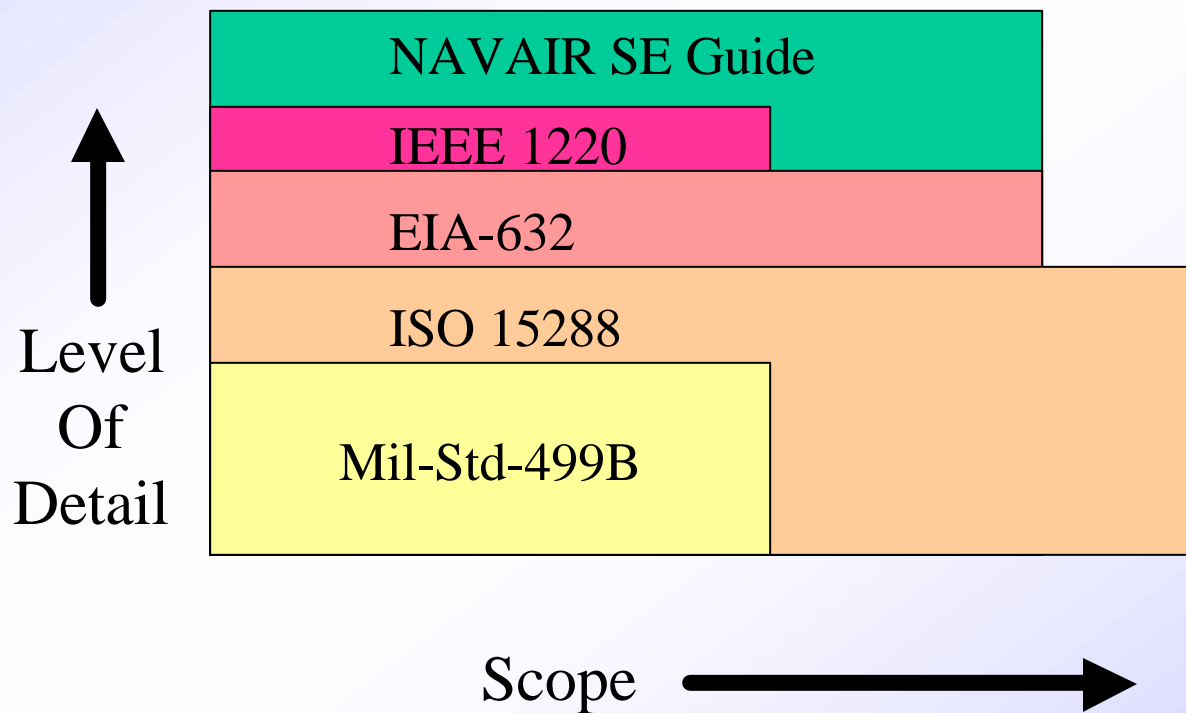
- Document overall NAVAIR TEAM systems engineering practices and processes.
- Replaces existing Processes:
  - **Mil-Std 499A/B**
  - **Conduct Systems Engineer Management (4.1.1)**
  - **Conduct System Development/Integration Engineering (4.1.2)**
  - **Conduct System Integration (4.1.2)**
- Adopt industry best practices and tenets.
- Comply with DODI 5000 requirements.
- Gives Direction and Guidance

# SEPWG Context Development



# Relationships of SE Process Standards

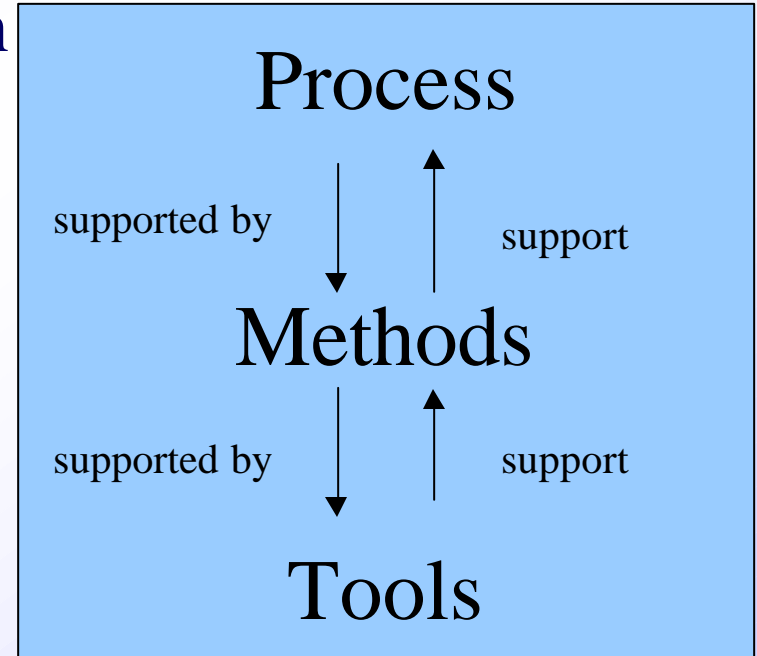
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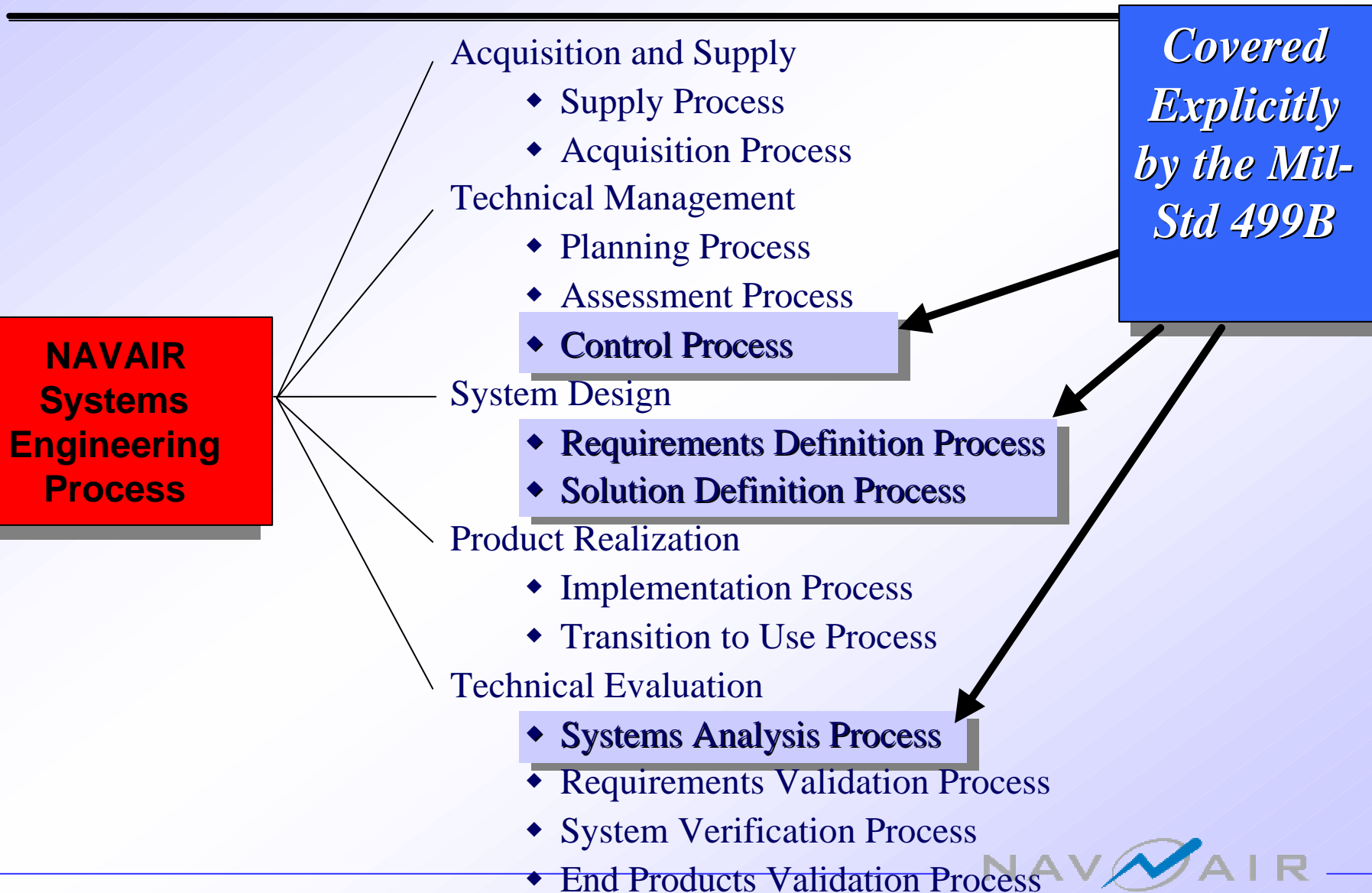
# What is the SE Guide?

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- Scope of SE Process Based on ANSI/EIA-632 Standard.
- Defines NAVAIR activities and tasks of the various processes and specifies particular methods and/or tools for implementation



# Old and New SE Process Comparison



# 33 Process Requirements

## **SUPPLY PROCESS REQUIREMENTS**

1—Product Supply

## **ACQUISITION PROCESS REQUIREMENTS**

2—Product Acquisition

3—Supplier Performance

## **PLANNING PROCESS REQUIREMENTS**

4—Process Implementation Strategy

5—Technical Effort Definition

6—Schedule and Organization

7—Technical Plans

8—Work Directives

## **ASSESSMENT PROCESS REQUIREMENTS**

9—Progress Against Plans and  
Schedules

10—Progress Against Requirements

11—Technical Reviews

## **CONTROL PROCESS REQUIREMENTS**

12—Outcomes Management

13—Information Dissemination

## **REQUIREMENTS DEFINITION PROCESS REQUIREMENTS**

14—Acquirer Requirements

15—Other Stakeholder Requirements

16—System Technical Requirements

## **SOLUTION DEFINITION PROCESS REQUIREMENTS**

17—Logical Solution Representations

18—Physical Solution  
Representations

19—Specified Requirements

## **IMPLEMENTATION PROCESS REQUIREMENTS**

20—Implementation

## **TRANSITION TO USE PROCESS REQUIREMENTS**

21—Transition to Use

## **SYSTEMS ANALYSIS PROCESS REQUIREMENTS**

22—Effectiveness Analysis

23—Tradeoff Analysis

24—Risk Analysis

## **REQUIREMENTS VALIDATION PROCESS REQUIREMENTS**

25—Requirement Statements  
Validation

26—Acquirer Requirements  
Validation

27—Other Stakeholder Requirements  
Validation

28—System Technical Requirements  
Validation

29—Logical Solution Representations  
Validation

## **SYSTEM VERIFICATION PROCESS REQUIREMENTS**

30—Design Solution Verification

31—End Product Verification

32—Enabling Product Readiness

## **END PRODUCTS VALIDATION PROCESS REQUIREMENTS**

33—End Products Validation

# Example

## Preceding Process

Supply Process  
     Sub-process 1  
 Planning Process  
     Sub-process 7  
 Requirements Definition Process  
     Sub-process 14  
 System Verification Process  
     Sub-process 31

## Inputs

- End Products (R1)
- Enabling Products (R1)
- Validation Plan (Operational Test Plan) (R7)
- TEMP (R7)
- OTRR (Internal or R7)
- MNS (R14)
- ORD (R14)
- DT/OT Transition Report (R31)
- Report of Test Results with limitations and constraints for (OT) (R31)
- Operational Advisory Document (R31)

## Entry Criteria

Inputs have been reviewed and approved by the appropriate agent. For most programs, the appropriate Development Test (DT) must have been successfully completed and a DT report issued.

## References

Standard References  
 DRAFT MIL-STD-499B  
 NAVAIR 3960.2 Series

## Sub-process 33: End Products Validation

### Purpose

Ensure that an end product, or an aggregation of end products, conforms to its validated acquirer requirements.

### Tasks

- a) Determine the type of end product validation required and the exit criteria, including the acquirer requirements applicable to the system end products being validated.
- b) Acquire the test article, or aggregation of end products, for the validation as appropriate to the enterprise-based life cycle phase and level of system structure.
- c) Conduct the end products validation in accordance with the Validation Plan, as required in the agreement, to show conformance with appropriate requirements; collect and analyze validation outcomes to identify any variances; and to appropriate process tasks to resolve variances and repeat appropriate verifications and validations.
- d) Revalidate with improved or corrected procedures and equipment, when variances were caused by poor test conduct and conditions.
- e) Record the validation outcomes, procedures, assumptions, lessons learned, and other pertinent information about the validation and results to provide traceability.

### Agents

OPTEVFOR  
 DOT&E  
 Systems Engineering  
 T&E

### Tools

SIL  
 HIL  
 M&S  
 Flight Test

Process author: Rebel

Code/Telephone: 4.1.1.1 / ???-???-????

## Next Process

Acquisition Process  
     Sub-process 2  
 Solution Definition Process  
     Sub-process 19  
 Implementation Process  
     Sub-process 20

## Outputs

### All outputs should be archived (R12)

- OTRR Plan (R33)
- OTRR certification message (R2)
- OT/OT&E Report (R19, 20)

## Exit Criteria

Outputs have been reviewed and approved by the appropriate agents.

## Metrics and Measures

OTRR is achieved within program schedule  
 Operational test procedures and processes are carried out according to the TEMP

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## 4.2.1 Planning Process

This process is used to support concept and project decision making and to prepare necessary technical plans that support and implement project plans in: (1) serve as a decision to supply services according to an external solicitation, (2) determine whether to proceed with an internal acquisition project for a new product or a product improvement, (3) guide the work effort that will meet the requirements of an established agreement, or (4) replace applicable processes for engineering a system. Replanning is normally initiated (1) when required by an agreement, (2) when significant variations or anomalies are identified from other Technical Management process outcomes, or (3) before implementation of the next acquisition-based life cycle phase.

The five sub-processes associated with the Planning Process are shown in Figure 4.2.1.

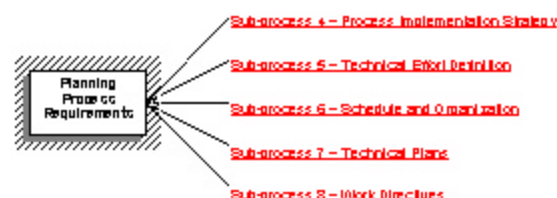


Figure 4.2.1 - Planning Process Sub-processes

### Sub-process 4 - Process Implementation Strategy

The developer shall define a strategy for implementing the adopted process of this Standard as a basis for project technical planning and that is in accordance with the agreement.

The intent is to provide enough information for the user to determine whether a given process activity is appropriate in supporting the objectives of the program or project they support, and how to go about implementing the process activity.

Note that the act of planning should not be carried out in a vacuum. It is iterative and thus will require inputs regarding the Technical Effort, Schedule, Technical Plans and Work Directives.

#### Providing Process

Requirements Definition Process

Sub-process 14: Acquire Requirements

#### Inputs

Operational Requirements Document (ORD) (R14)

Mission Needs Statement (MNS) (R14)

#### Entry Criteria

Inputs have been approved by the appropriate agency.

This is where it all starts. When someone asks the simple question, "What's your plan?" or "How are you going to go it done?" It is initiated when things change significantly, like funding, requirements, or schedule.

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This process occurs at the very beginning of a Major Acquisition Milestone 0 and is revisited at each subsequent Major Milestone 1-7. An example of when you may revisit this process would be when a RFP is not going to be used, requirements change, or direct funding/schedule changes.

For less formal projects, the entry criteria can simply be a request from a Program Manager for Systems Engineering resources.

#### Tasks

The developer shall plan and do appropriate tasks to complete this requirement. Tasks to consider include the following:

- Identify stakeholders who will have an interest or stake in the outcome of the process. Consider stakeholders in both the Funding Chain and Boundary (or users) Chain (sub-stakeholders, primary).
- Identify and acquire applicable documents and the requirements therein, that could affect the process. This will ensure the current and accurate documentation of the Engineering Standard. The System Engineer is responsible for the implementation of and adherence to approved policies and processes (Class Data Circulation; R&D of the CD, slide 14, 18). Making the applicable documents available in a project library enables the project's processes to easily access the process-based information as they perform their work. As a minimum, list the documents, names, versions and date for historical purposes. This information should be stored in the access information repository established in [Sub-process 5](#).
- Identify essential process approaches for developing products, services, systems, and information that will require enabling products to be developed or produced (e.g., tool, training, etc.).
- Identify applicable acquisition-based life cycle phases (see Annex B), external work products, outputs, applicable management reviews, and life-cycle phases such as a DoD 5000 guide this effort and is required for major acquisition programs.
- Identify and define how the applicable processes of this Standard will be integrated, how revised and external projects will be involved, and how they will be managed.
  - Read all of EW 632M to gain the overall understanding of the processes, the EW 632M philosophy and approach.
  - Take into account the phase and scope of your program using the available documents and DoD 5000, if required. Early in a program, e.g. Phase 0, fewer guiding documents will be available compared to later in the program.
  - Look at the "System Engineering Output Summary Table" and identify an initial list of which inputs and outputs are required in various the program.
  - Tracing the inputs and outputs through EW-632M will reveal a number of things:
    - Determine the level of process applicability and tailoring required.
    - Additional inputs required.
    - Support resources required and where those resources are available.



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**Sub-process 8 – Work Directives****The developer shall create work directives that implement the planned technical effort.****Providing Process****Acquisition Process**

Sub-process 2: Product Acquisition

**Planning Process**

Sub-process 4: Process Implementation Summary

Sub-process 5: Technical Effort Definition

Sub-process 6: Schedule and Organization

**Requirements Definition**

Sub-process 16: System Technical Requirements

**Inputs**

- Process Implementation Summary (R4)
- Life Cycle Phase Chart (R4)
- Total Life Cycle Cost Objectives (R5)
- Organizational Summary (R6)
- Integrated Master Schedule (R6)
- Earned Value Management Schedule (EVMS) (R5)
- Cost, schedule, and performance measures (R2)
- System technical requirements (R16)

**Entry Criteria**Inputs have been approved by the appropriate review.  
(Not for resources)

The developer should plan to do appropriate work to complete this requirement. Tasks to consider include the following:

- a) Develop individual project team or organization work packages that describe the work to be done, resource sources, schedule, budget, and reporting requirements

**Statement of Work (SOW).** The Statement of Work (SOW) is a portion of a contract which establishes and defines all non-specified requirements for contractor efforts such directly as with the use of specific oral documents. See MIL-STD-245D

**Statement of Objectives (SOO).** The Statement of Objectives (SOO) is a portion of a contract which establishes a broad description of organizational required performance objectives

**Team Work Plan (TWP).** The Team Work Plan (TWP) addresses labor by category, material, word, flight, cost, expendable, range requirements and laboratory requirements. The TWP might include: a program summary, cost/minutes, references, and/or resources, technical requirements, schedule, reports and documents to be provided, future planning information, associated authority, source and disposition of equipment, and security classifications

- b) Obtain work authorizations for the team or organization that provide approval for applicable team or organizations to complete their work package requirements and to release resources

**Team Assignment Agreement (TAA).** MAYA R has issued the Team Assignment Agreement (via MAYA R RMS T 5400 134 dated 15 August) as the vehicle to establish agreements

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and procedures within MAYA R for the assignment of resources to Team 1 documents the work to be used to describe the work to be done, resources, schedule, funding, and reporting requirements for contractor support. The program office may use a different mechanism for issuing their revised resource requirements

The final product is the signed Team Assignment Agreement (TAA) that covers both the program and contractor requirements. The TAA should address the following: work, functions, products, and/or services to be provided, funding summary, availability/duration of resources, authority/empowerment level, issuing requirements and approvals, collection requirements, performance evaluation reports required, administrative functions delegated to Team leadership, and the issue resolution process to be employed

**Outputs**

All outputs should be achieved (R2)

- Team Assignment Agreement (TAA) (R1)
- Team Work Plan (TWP) (R11)
- Statement of Objectives (SOO) (R2, R15, R30)
- Statement of Work (SOW) (R2, R15, R30)

**Exit Criteria**Outputs have been approved by the appropriate review.  
(TAA Signed, WBS defined)**Review Process****Supply Process**

Sub-process 1: Product Supply

**Acquisition Process**

Sub-process 2: Product Acquisition

**Control Process**

Sub-process 12: Customer Management

**Requirements Definition Process**

Sub-process 15: Other Subordinate Requirements

**System Verification Process**

Sub-process 30: Design Solution Verification

**Agents**

Acquire: PEOPMA, IPT

**Tools**

WBS, TAA Form

**References**

Standard across all system engineering efforts:

- [DoD 5000 Series](#)
- [Defense Acquisition Handbook](#)
- [FAR/DFARS](#)
- [Defense Systems Management College: Systems Engineering Fundamentals](#)
- [LMC/SEC Systems Engineering Handbook](#)

MAYA R TAA Issuance and Form

EVM System Industry Standards (ANSI EIA-748-1992)

MIL-STD-881 and MIL-HDBK-881, [DoD Handbook – Work Breakdown Structure](#), 2 January 1992[MIL-STD-245D](#)**Derive and Measure**

Risk Cube, EVMS, WBS, Capability Maturity

## Annex Z – NAVAIR References

Filename	Reference Info
	(Note: cancelled documents begin with an "X" and are noted in the title these are the best known references at the time of publishing, but are ONLY to be used as references)
AIAA OCD Prep	American Institute of Aeronautics and Astronautics (AIAA) (1992). Operational Concept Document (OCD) Preparation Guidelines.
Blanchard SE	Blanchard, Benjamin S. and Fabrycky, W.J. (1997). <u>Systems Engineering and Analysis</u> (3 <sup>rd</sup> ed.). Upper Saddle River, NJ: Prentice Hall.
Brooch OOA	Brooch, Grady. <u>Object-oriented Analysis and Design with Applications</u> (2 <sup>nd</sup> ed.) (1994). Santa Clara, CA: Benjamin/Cummings
DAD	Defense Acquisition Deskbook. <a href="http://web2.deskbook.osd.mil/">http://web2.deskbook.osd.mil/</a>
	Defense System Management College. <u>Press Report of the 1992-1993 Military Research Fellows Virtual Prototyping—Concept to Production</u> . Published?
	Defense System Management College Press (1999). <u>Models and Simulations: Systems Acquisition Manager's Guide</u> . Fort Belvoir, VA: Author
DSMC SE Fundamentals	Defense System Management College Press (1999). <u>Systems Engineering Fundamentals</u> . Fort Belvoir, VA: Author
DI-GDRQ-81222	Department of Defense. <u>Requirement Allocation Sheets (RAS) Data Item Description</u> (DI-IPSC-81222). Arlington, VA: Author
DI-IPSC-81430	Department of Defense. <u>Operational Concept Description (OCD) Data Item Description</u> (DI-IPSC-81430). Arlington, VA: Author
DI-IPSC-81431	Department of Defense. <u>System/Subsystem Specification (SSS) Data Item Description</u> (DI-IPSC-81431). Arlington, VA: Author
DI-IPSC-81432	Department of Defense. <u>System Architecture Design (SSDD) Data Item Description</u> (DI-IPSC-81432). Arlington, VA: Author
DI-IPSC-81433	Department of Defense. <u>Software Requirements Specification (SRS) Data Item Description</u> (DI-IPSC-81433). Arlington, VA: Author
DI-IPSC-81434	Department of Defense. <u>Interface Requirements Specification (IRS) Data Item Description</u> (DI-IPSC-81434). Arlington, VA: Author
DI-IPSC-81435	Department of Defense. <u>Software Design Description (SDD) Data Item Description</u> (DI-IPSC-81435). Arlington, VA: Author
DI-IPSC-81436	Department of Defense. <u>Interface Design Description (IDD) Data Item Description</u> (DI-IPSC-81436). Arlington, VA: Author
DI-IPSC-81437	Department of Defense. <u>Database Design Description (DBDD) Data Item Description</u> (DI-IPSC-81437). Arlington, VA: Author
DI-IPSC-81441	Department of Defense. <u>Software Product Specification (SPS) Data Item Description</u> (DI-IPSC-81441). Arlington, VA: Author
DI-IPSC-81442	Department of Defense. <u>User Software Version Description (SVD) Data Item Description</u> (DI-IPSC-81442). Arlington, VA: Author
DoD 5000 Series	Navy Acquisition and Business Management website: <a href="http://www.abm.rda.hq.navy.mil/acqtech.cfm#DoD">http://www.abm.rda.hq.navy.mil/acqtech.cfm#DoD</a>
DOD 5000.1	Department of Defense. (2000) <u>The Defense Acquisition System (DoDD 5000.1)</u> . Fort Belvoir, VA: Author
DOD 5000.2	Department of Defense. (2000) <u>Operation of the Defense Acquisition System (DoDI 5000.2)</u> . Fort Belvoir, VA: Author
DOD 5000.2-R	Department of Defense. (2000) <u>(Interim) Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs (DoD 5000.2-R)</u> . Fort Belvoir, VA: Author

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# Annex I – NAVAIR Speciality Engineering References

## 3 SPECIALTY ENGINEERING TABLE

TECHNICAL DESCRIPTION	REFERENCE
Change information	ML-HDBK-310
Computer and acquisition and logistics support	ML-HDBK-39
Continuous production and manual	ML-HDBK-1150
	ML-HDBK-1568
Environmental analysis	ML-STD-810
Electromagnetic compatibility	ML-STD-1541
	ML-STD-464
	ML-HDBK-437
Electromagnetic discharge	ML-STD-1688
Human factors	ML-STD-1472
	ML-HDBK-46255
Logistics	ML-HDBK-302
	ML-PRF-49506
Maintainability	ML-HDBK-470
	ML-HDBK-791
Maneuverability response	ML-HDBK-728
	ML-HDBK-431
Pass manual	ML-HDBK-963
Qualification	ML-HDBK-777
Reliability/durability	ML-HDBK-1130
	ML-HDBK-87244
	ML-HDBK-1798
	ML-HDBK-2164
System safety engineering	ML-STD-882
Software	ML-STD-498
Supportability	ML-HDBK-302
Survivability	ML-HDBK-1799
	ML-HDBK-2069
	ML-HDBK-336
System security	ML-HDBK-1783
Technical manual	ML-STD-188-xxx
Testability	ML-HDBK-2163
Technical design analysis	ML-HDBK-251
Training requirements	ML-HDBK-1379
Transportability	ML-STD-1366
Weight & balance manual	SAWBRP?
Software Development	ML-STD-498
Software Life Cycle	IEEE W 8012207
Software Support Environment	ML-HDBK-1467
Software Support Environment	DDG-STD-1467
Preparation of Statement of Work (SOW)	ML-HDBK-243
Configuration Management	ML-STD-473
Configuration Management	ML-STD-2349
Work Breakdown Structure	ML-HDBK-381
Work Breakdown Structure	ML-STD-881
Digital Manual Check (DMC)	ML-PRF-29023

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## 3 SPECIALTY ENGINEERING TABLE

TECHNICAL DESCRIPTION	REFERENCE
Digital Data Bus	ML-STD-1553B
Fiber Optic Data Bus	ML-STD-1773
Asynchronous Transfer Mode (ATM)	ML-STD-188-176
DMF MESA/TOM DATA	ML-STD-188-183
Timing & Sync	ML-STD-188-113
Interface Shipboard Systems	ML-STD-1399
Human Engineering	ML-STD-1472
Military Training Programs	ML-STD-1379
Reliability Training	ML-HDBK-781
Reliability Training	ML-STD-781
Electronic Reliability Design	ML-HDBK-338
USMTF Message Formatting	ML-STD-6040
Vibrations	ML-STD-1674
Electromagnetic Emissions	ML-STD-461
EMC Mitigation	ML-STD-463
Shielding for Communications Systems	ML-STD-188-124
Mixed mode Test Methods	ML-STD-882
System Safety	ML-STD-882
Engineering Drawing Process	ML-STD-100
Abbreviations	ML-STD-12
Making for Shipments & Storage	ML-HDBK-129
Test Manuals, Data Base	ML-STD-87269
Sampling Procedures	ML-STD-103
Quality	ML-STD-9858
Software	DDG-STD-2167
Software	DDG-STD-2168
Review & Audit, Software	ML-STD-1521B
Logistics Support Analysis	ML-STD-1388
Database System Manuals	ML-STD-961
Database STD & HDBKS	ML-STD-962
Technical Manuals	ML-STD-40031
Test Reports	ML-STD-831
Electromagnetic Discharge	ML-STD-1686
Test Equipment	ML-STD-1364
Test Methods	ML-STD-136
Standardization Program Requirements	ML-STD-680
Technical Data Package	ML-DTL-31000A
Configuration Management Guidelines	ML-HDBK-61
Acquisition Logistics Handbook	ML-HDBK-302
Cost Engineering	ML-HDBK-1010A
Making for Shipments & Storage	ML-STD-129
Making for Shipments & Storage	ML-HDBK-129
EMC Mitigation & Computer Programs	ML-STD-483
Design in Cost	ML-STD-337
Procedural Wiring	ML-STD-275
Engineering Management	ML-STD-499
Quality Assurance Terms & Definitions	ML-STD-109
Reliability	ML-STD-783

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# Value of the NAVAIR Systems Engineering Guide

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- **Serve as Single Reference**
- **Captures NAVAIR Process and Best Practices**
- **Provides a Common Lexicon**
- **Intended As Guide for Systems Engineer**
- **Gives Direction and Guidance**



**Provides a consistent structure for the development of programs.**

# Status

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- Draft NAVAIR Systems Engineering Guide Completed.
- Review of Document In Progress.
  - Limited External Review by INCOSE, EIA, and Industry Performed
  - Incorporating Comments
- Permission to Use EIA-632 Copy Right Material Approved.
- Second Review Scheduled (Nov '02) – larger distribution
  - First Scheduled Release – Winter 2002
- Training will be developed with DAU – Spring '03

# Others Interested in SE Guide Implementation

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- Buy-in from all three System's Commands (NAVAIR, NAVSEA, and SPAWAR) to continue the development of common SYSCOM S.E.
- AIR Force and Army
- NASA
- Evolve to be INCOSE Guidebook for EIA-632
- Evolve to be next revision to the EIA-632 Standard

# Summary

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NAVAIR has a focused, strong SE capability/competency that is critical to program success.

SE Department critical elements include:

- Technical accountability
- Single entry point for customers
- Standard process development and implementation
- SE advocacy